Clear Address List button clears all web servers from the list. The Add Server button adds a new web server to the list. The Modify Server button modifies the parameters corresponding to a server in the list.

[134] A preferred embodiment uses a DCOM server packed into a Windows-based executable process called an "OLE DB-Connection Redirector." This object is able to keep track of the load-statistic of a set of database servers and to supply a predefined connection string corresponding to the selected database server when requested. This redirector object must be active to monitor the database severs. Therefore, the application must be manually started once installed. This is different from commonly used automation servers that are automatically activated upon client requests.

[135] Instead of directly assigning connection strings to their connection objects, developers create a remote instance of the redirector and request a valid connection string from it. Using this connection string guarantees that the best available database server is selected.

[136] The HTTP Redirector Configuration screen is shown in Fig. 5H.

[137] The Functional Resource Pool area is the source list of data base servers. The SLO Address field refers to an SLO-node installed in one of the computers belonging to the pool. Statistics are retrieved from a single SLO instead of asking individually. To retrieve the list of servers from the SLO-node the Get Servers button is pressed.

[138] The Server Selection Method area indicates how servers are selected for redirection. Choices include a database server with the Best Statistic or Round Robin fashion. The Database Connection List displays a list of database servers and connection strings included for redirection. These are the database servers that might receive the redirector connection requests. Items in the list can be added, removed, or modified.

[139] The Remove Selected button removes the selected database connection from the list. The removed connection is not included in any further redirection. The Remove All button is used to remove all connections from the list. The Add DB Connection button adds a database connection to the list. The Modify DB Connection is used to modify the parameters corresponding to a connection in the list.

[140] Once all modifications are introduced, a configuration can be updated by pressing the OK button. Canceling the operation doesn't modify the current configuration.

[141] After clicking on the Add DB Connection button, the Create Connection dialog is shown in Fig. 5I. This dialog allows a new OLE DB connection to a database server to be defined. Connection parameters include a connection string and the name of the server.

[142] The connection string can be typed directly, loaded from a Universal Data Link (UDL) file or edited using the corresponding system dialog. Connection strings can be manually or automatically tested before saving to the current configuration. Automatic testing is performed when the "Test database connection before save" box is checked. The testing process attempts to open a database connection using the given connection string.

[143] Note that there are situations when testing a connection doesn't make sense. This occurs when the redirector and the database server are located on different domains. Applications requesting a connection might use aliases to reach the database servers and these aliases can be unknown to the redirector.

[144] If the connection string is loaded from a file, then the file is selected using the Load Data Link File dialog, shown in Fig. 5J. This is a common dialog oriented to search for UDL files.

[145] Another possibility is to select the Edit Connection String button, which opens the Data Link Properties window shown in Fig. 5K. This dialog contains a wizard that allows a step-by-step definition of the properties.

[146] After loading from a file or defining through the Data Link wizard, the resulting connection string is loaded into a confirmation dialog, shown in Fig. 5L, which identifies the name of the provider, the parameters and the settings for security. Fig. 5L shows a confirmation dialog when security is turned off. The identification confirms the settings made previously. To change the provider or the parameters, the Modify Parameters button is pressed to return to the system wizard. Security settings can be modified directly in this dialog by selecting different security settings and/or modifying the username and password associated to the connection.

[147] Fig. 5M shows the confirmation dialog with security turned on.

[148] In Fig. 5M, once the OK button is pressed, control is returned to the Create Connection dialog, containing the resulting definitions.

[149] The process of modifying an existing database connection includes some of the same steps discussed previously. To launch the process, a connection at the Configuration Dialog is selected and then the Modify DB Connection button is pressed.

System Level Objects

[150] Before system optimization is determined, the value of each node is measured. In order to collect these measurements, intelligence objects (IOs) are deployed across a DASPO network. These intelligence objects gather statistics on the processes and system

loads that are generated at each server node. The format, formation and use of the values, statistics and node information is discussed in detail in the co-pending patent applications referenced, above. Node information includes CPU usage, size and usage statistics of memory and storage space, bytes read/written per second, number of threads, number of processes executing at the node, processor queue length, local response time and network response time. Note that many other types of information about the node, node environment, node host, processor, etc., can be included. Also, not all of the listed node information need be used in order to practice the present invention. In general, any type of information about resource use, performance or other characteristics can be used.

[151] As mentioned, a preferred embodiment of the invention uses two types of intelligence objects called System Level Object (SLOs) and Transactional Level Objects (TLOs). In a preferred embodiment, SLOs are the most commonly deployed intelligence object. Both SLOs and TLOs perform similar information gathering duties, but TLOs have the additional responsibility of providing statistics for any servers where special hosts (i.e., programs that provide data access and security between an application and a database) are set up. Note that a "host" or "host computer" can be any digital processing hardware device, or software process, that can perform a function on data in a network.

[152] Before system optimization can be determined, the value of each node must first be measured. In order to collect these measurements, intelligence objects (IOs) are deployed across a DASPO network. These intelligence objects gather statistics on the processes and system loads that are generated at each server node. The most commonly deployed IO is the System Level Object (SLO).

[153] SLOs can be installed on remote computers from a central point and is able to work across MS-Windows and TCP/IP networks. Installations can be made on computers running Windows 95/98, Windows NT, Windows 2000, Linux and Solaris UNIX. Depending on the platform, configuration and available services on the target machine, installations take place by means of ftp, telnet, network shared drives and/or DCOM.

[154] The installation process consists of four main stages as follows: (1) Selecting target nodes; (2) Specifying server general settings (3) Specifying file-transfer and remote-execution settings for each node and (4) Executing the installation procedure.

[155] The remote installation mechanism is built around a Windows application and a set of auxiliary files that are actually moved to the target computers to perform the installation. The remote installation mechanism consists of two parts--one for transferring files to the server, and another to launch the installation process on the remote server. For